

CLAIMS

What is claimed is:

1. An uncured composite product comprising:
 - a fibrous reinforcement layer including a first side, a second side and having a thickness between said first and second sides;
 - a resin layer located on said first side of said fibrous layer, said resin layer comprising a thermosetting resin that is in a low flow state when said thermosetting resin is at a first temperature and a high flow state when said thermosetting resin is at a second temperature and wherein said second temperature is higher than said first temperature and the viscosity of said thermosetting resin in said low flow state is higher than the viscosity of said thermosetting resin in said high flow state; and
 - a hardening agent layer located on said second side of said fibrous layer, said hardening agent layer comprising a hardening agent for said thermosetting resin wherein said fibrous reinforcement provides a physical barrier that prevents contact between said thermosetting resin and said hardening agent when said thermosetting resin is in said low flow state and wherein said fibrous reinforcement does not provide a physical barrier that prevents contact between said thermosetting resin and said hardening agent when said thermosetting agent is in said high flow state.
2. An uncured composite product according to claim 1 wherein said hardening agent layer comprises a fibrous layer.
3. An uncured composite product according to claim 1 or 2 wherein said resin layer comprises a fibrous layer.
4. An uncured composite product according to claim 2 or 3 wherein said fibrous layer in said hardening agent layer includes a first side adjacent to said fibrous reinforcement layer, a second side and a thickness between said first and second sides and wherein at least said second side of said fibrous layer in said hardening agent layer is free of said hardening agent.
5. An uncured composite product according to claim 3 or 4 wherein said fibrous layer in said resin layer includes a first side adjacent to said fibrous reinforcement layer, a second side and a thickness between said first and second sides and wherein at least said second side of said fibrous layer in said resin layer is free of said thermosetting resin.

6. An uncured composite product according to claims 1-5 wherein said hardening agent is in a low flow state when said hardening agent is at a first temperature and a high flow state when said hardening agent is at a second temperature and wherein said second temperature is higher than said first temperature and the viscosity of said hardening agent in said low flow state is higher than the viscosity of said hardening agent in said high flow state.

7. An uncured composite product according to claims 1-6 wherein said resin layer is in the form of an adhering film.

8. An uncured composite product according to claims 1-6 wherein said resin layer is in the form of a paste.

9. An uncured composite product according to claims 1-8 wherein said resin layer is covered with a protective film or paper.

10. An uncured composite product according to claims 1-9 wherein said hardening agent layer is in the form of an adhering film.

11. An uncured composite product according to claims 1-10 wherein said hardening agent layer is in the form of a paste.

12. An uncured composite product according to claims 1-11 wherein said hardening agent layer is covered with a protective film or paper.

13. An uncured composite product according to claims 1-12 wherein said fibrous reinforcement layer comprises unidirectional filaments.

14. An uncured composite product according to claims 1-12 wherein said fibrous reinforcement layer comprises woven fabric.

15. An uncured composite product according to claims 1-12 wherein said fibrous reinforcement layer comprises non-woven fabric.

16. An uncured composite product according to claims 1-15 wherein said thermosetting resin is selected from the group consisting of epoxy resins, vinyl ester resins, bismaleimide resins, phenolic resins and mixtures thereof.

17. An uncured composite product according to claims 1-16 wherein said fibrous reinforcement layer comprises fibers selected from the group consisting of glass fibers, carbon fibers and aramid fibers.

18. An uncured composite product according to claims 1-17 wherein said hardening agent is selected from the group consisting of cyanoguanidines, aliphatic and aromatic amines, acid anhydrides, Lewis acids, imidazoles, substituted ureas and hydrazines.

19. An uncured lay up that comprises a plurality of composite products according to claims 1-18 wherein said composite products are stacked together such that said resin layers and said hardening agent layers do not touch each other.

20. A cured composite material comprising an uncured product or uncured lay up according to claims 1-19 that has been heated to a temperature above said second temperature for a sufficient time to cure said uncured product or uncured lay up.

21. A method for making an uncured composite product comprising the steps of:
providing a fibrous reinforcement layer including a first side, a second side and having a thickness between said first and second sides;

applying a resin layer to said first side of said fibrous layer, said resin layer comprising a thermosetting resin that is in a low flow state when said thermosetting resin is at a first temperature and a high flow state when said thermosetting resin is at a second temperature and wherein said second temperature is higher than said first temperature and the viscosity of said thermosetting resin in said low flow state is higher than the viscosity of said thermosetting resin in said high flow state; and

applying a hardening agent layer to said second side of said fibrous layer, said hardening agent layer comprising a hardening agent for said thermosetting resin wherein said fibrous reinforcement provides a physical barrier that prevents contact between said thermosetting resin and

said hardening agent when said thermosetting resin is in said low flow state and wherein said fibrous reinforcement does not provide a physical barrier that prevents contact between said thermosetting resin and said hardening agent when said thermosetting agent is in said high flow state.

22. A method for making an uncured lay up that comprises a plurality of composite products according to claims 1-18, said method comprising the step of stacking said composite products together such that said resin layers and said hardening agent layers do not touch each other.

23. A method for forming a cured composite material comprising the step of heating an uncured product or uncured lay up according to claims 1-19 to a temperature above said second temperature for a sufficient time to cure said uncured product or uncured lay up.

24. A method for forming a cured composite material according to claim 23 that includes the additional step of vibrating said uncured product or uncured lay up during said heating step.